"Participatory Watershed Research: Linking Citizens to Scientists through the NH Lakes Lay Monitoring Program"

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&

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UNIVERSITY of NEW HAMPSHIRE
COOPERATIVE EXTENSION

NEW HAMPSHIRE LAKES LAY MONITORING


LAKES LAY MONITORING PROGRAM
UNH CENTER FOR FRESHWATER BIOLOGY
UNIVERSITY of NEW HAMPSHIRE
COOPERATIVE EXTENSION

LLMP Program Objectives

- Baseline monitoring for long-term trend detection.
- Locate problem areas and “hotspots”.
- Provide unbiased data for informed watershed management decisions.
- Develop protocols for citizen monitoring.
- Conduct participatory research that addresses concerns of participants.

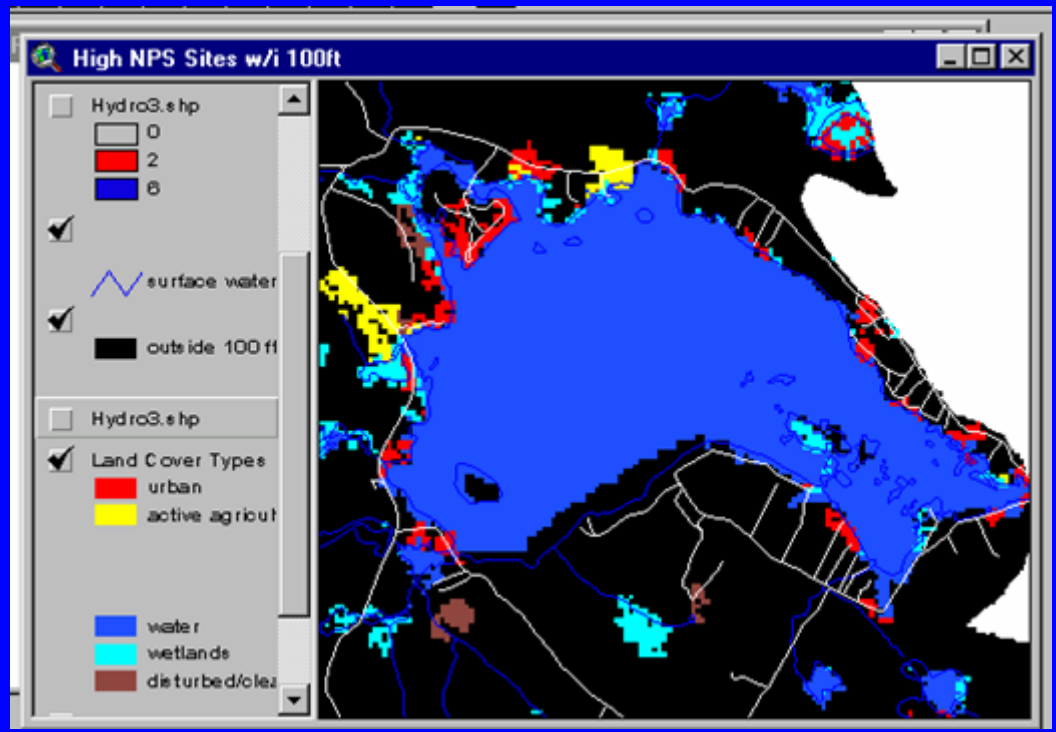
COST EFFECTIVE DATA COLLECTION

ASSURED/ QUALITY CONTROLED METHODS

The NH LLMP Model

Low Tech Data Gathering Approach

High Tech Applications

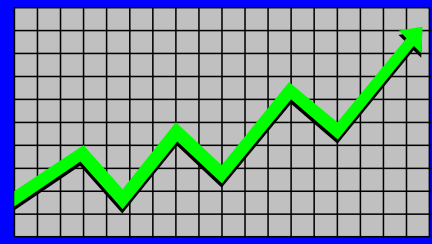


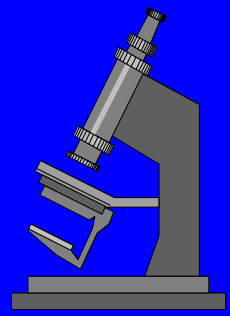
Participatory Research

- Involves community members in the design and implementation of research projects.
- Research processes and outcomes should benefit the community.
- Community members should be part of the analysis and interpretation of data and should have input into how the results are distributed.
- Productive partnerships between researchers and community members should be encouraged to last beyond the life of the project.

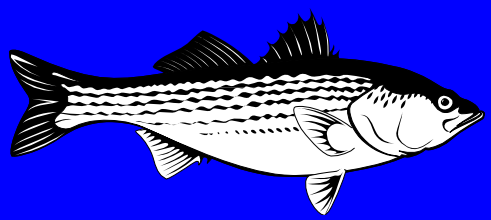
LLMP: Participatory Research

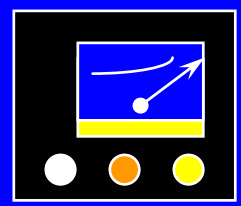
- **Determinants and Indicators of Water Quality:**
  - **Influence of Weather Events**
  - **Land Use / WQ Relationships**
  - **Biological Assessments/Indicators**
  - **Blue Green “Algae” Toxins**
  - **Recreational Impacts**

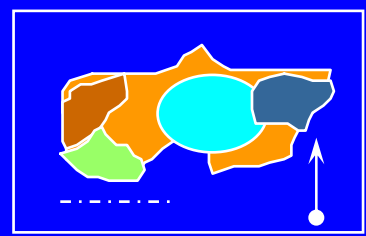




- **Trend Analysis**
- **Non-native Species (Zebra Mussel, Milfoil)**
- **Habitat Change and Species Condition**







Collaborative Research

- Blue Green Algae Toxins
  - Genetics
  - Biochemistry
  - Plant Bio. & Zoology
  - Resource Economics
- GIS Applications
  - Complex Systems Research Center (EOS)
- NPS Pollutants
  - Jackson Laboratory
- Mercury Deposition
  - Complex Systems
  - Water Resources Research Center
- Economic value of Lakes
  - Resource Economics

UNH Student Involvement

- FBG Field Team
- Fall/Spring Semester
- Interns
- Field Experience
- Practicums
- Senior projects
- Undergraduate Research Projects
- Graduate Student Res.
- Guest lectures
- Courses

- Biology
- Hydrology
- Plant Biology
- Zoology
- Microbiology
- Natural Resources
- Civil Engineering
- Community Outreach

Fish Condition Study

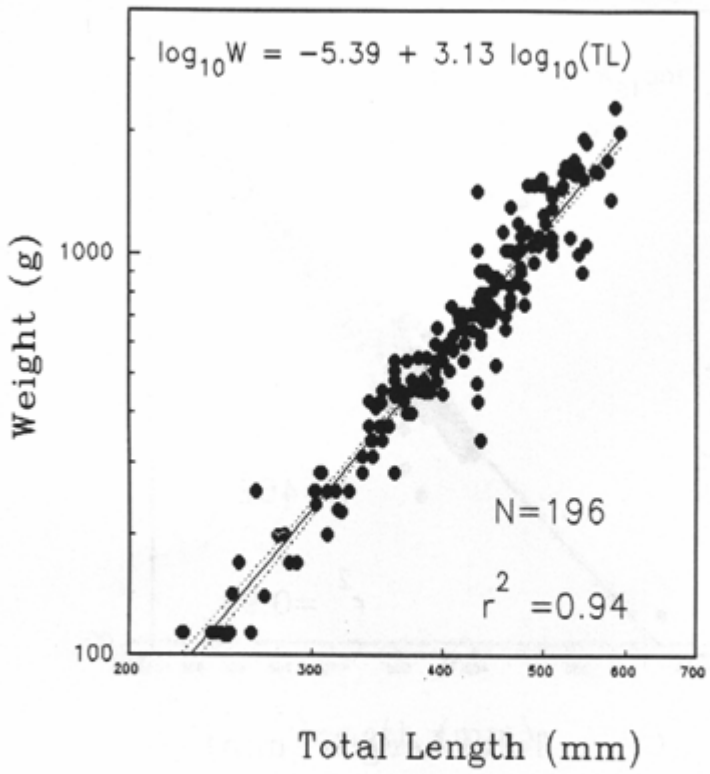


Figure 20. Length–weight relationship of landlocked salmon in New Hampshire lakes. Dotted lines are 95% confidence intervals of the regression line.

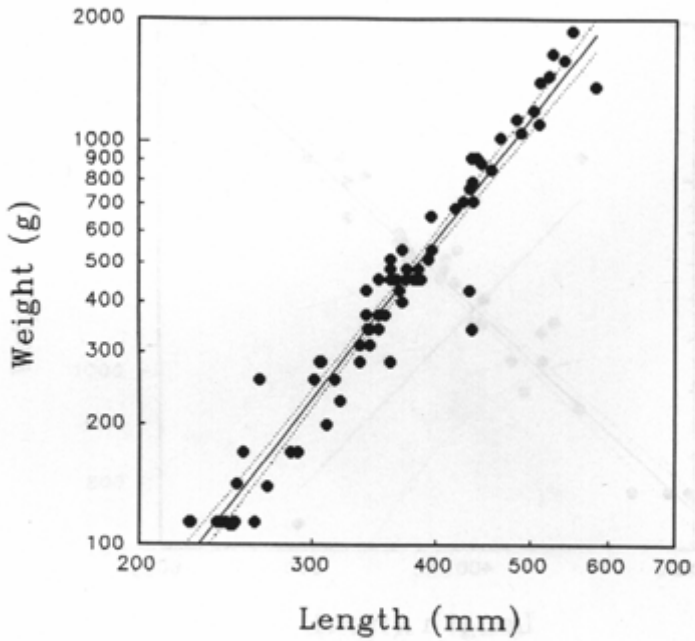


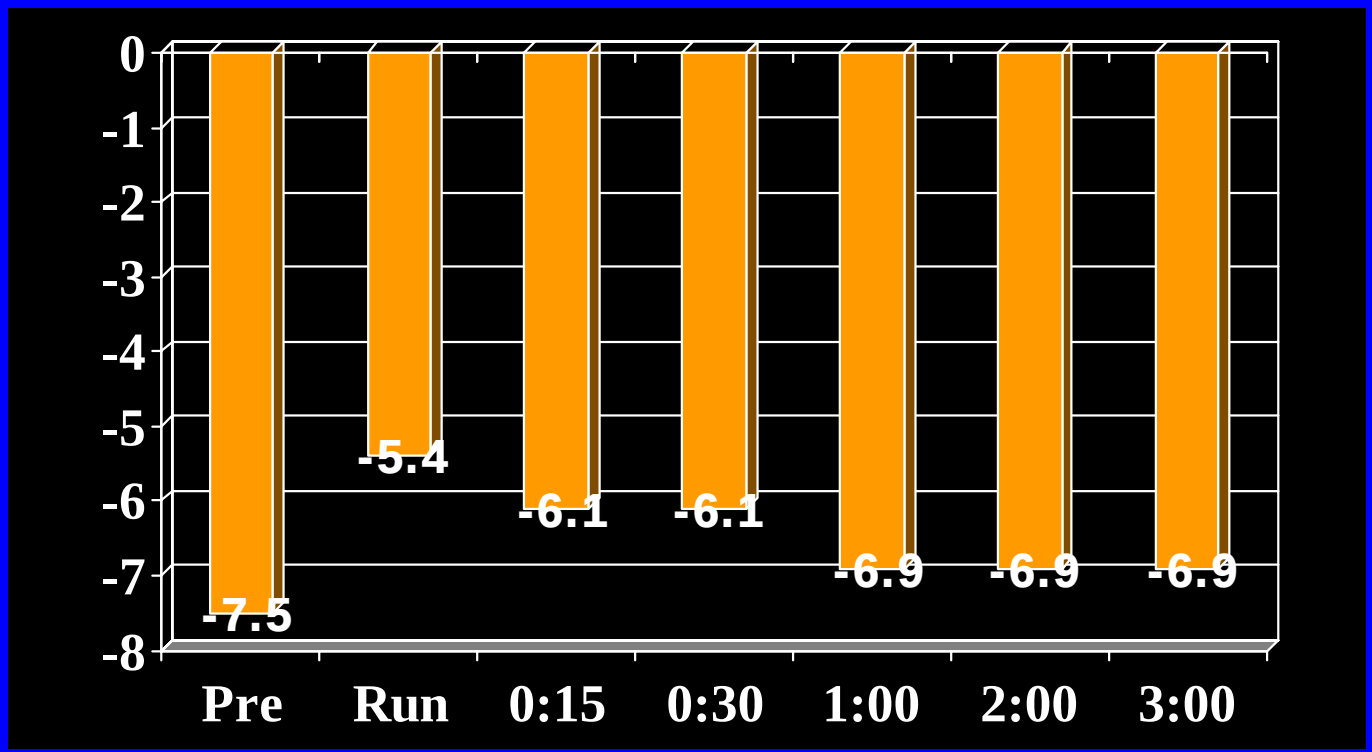
Figure 10. Length–weight relationship of landlocked salmon in SecondConnecticut Lake, 1990. Dotted lines are 95% confidence intervals of the regression line.

Boating Impacts

- Hydrocarbons/Additives
- Shoreline erosion
- Water column stability/ Mixing / Sediment Resuspension
- Habitat Disturbance

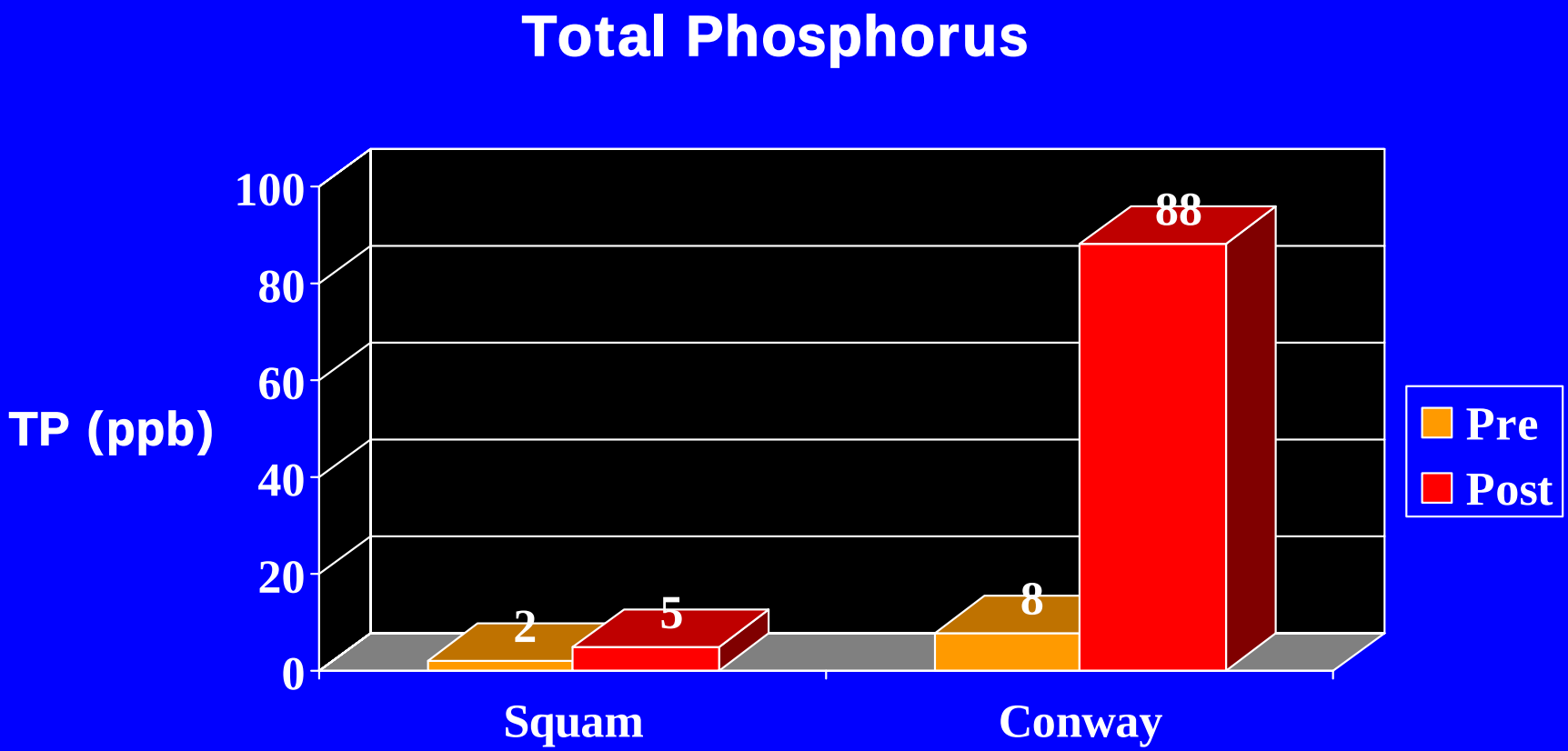
UNH Motorboat Studies

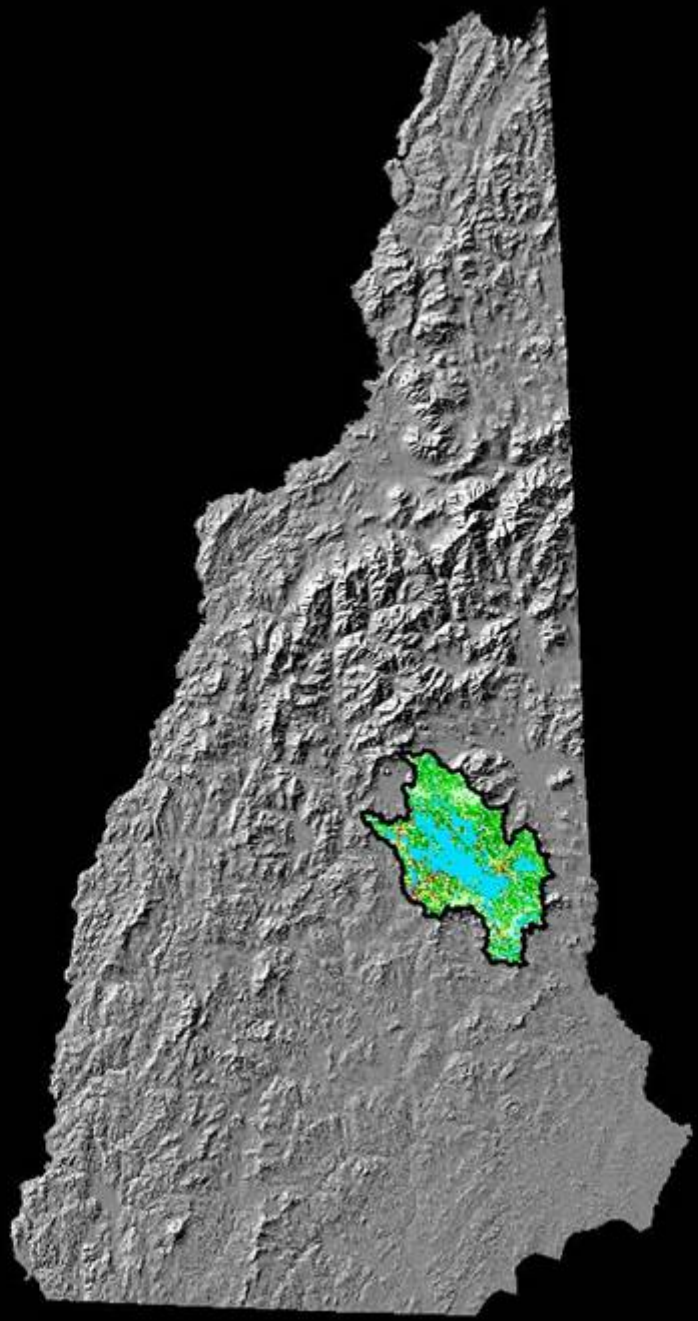
Beaver Lake (Derry) 1986 – SD Transparency (m)



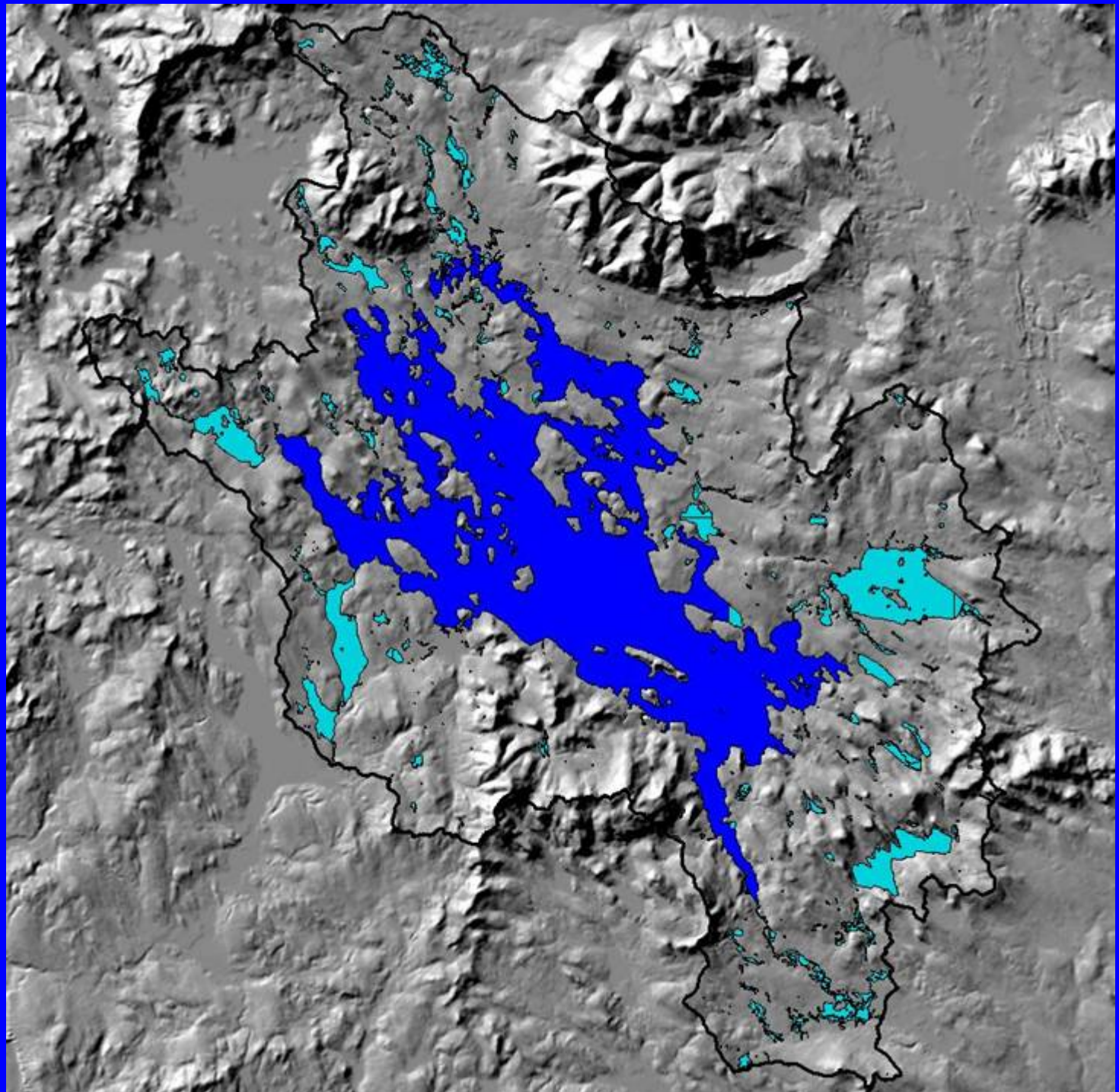
UNH Motorboat Studies

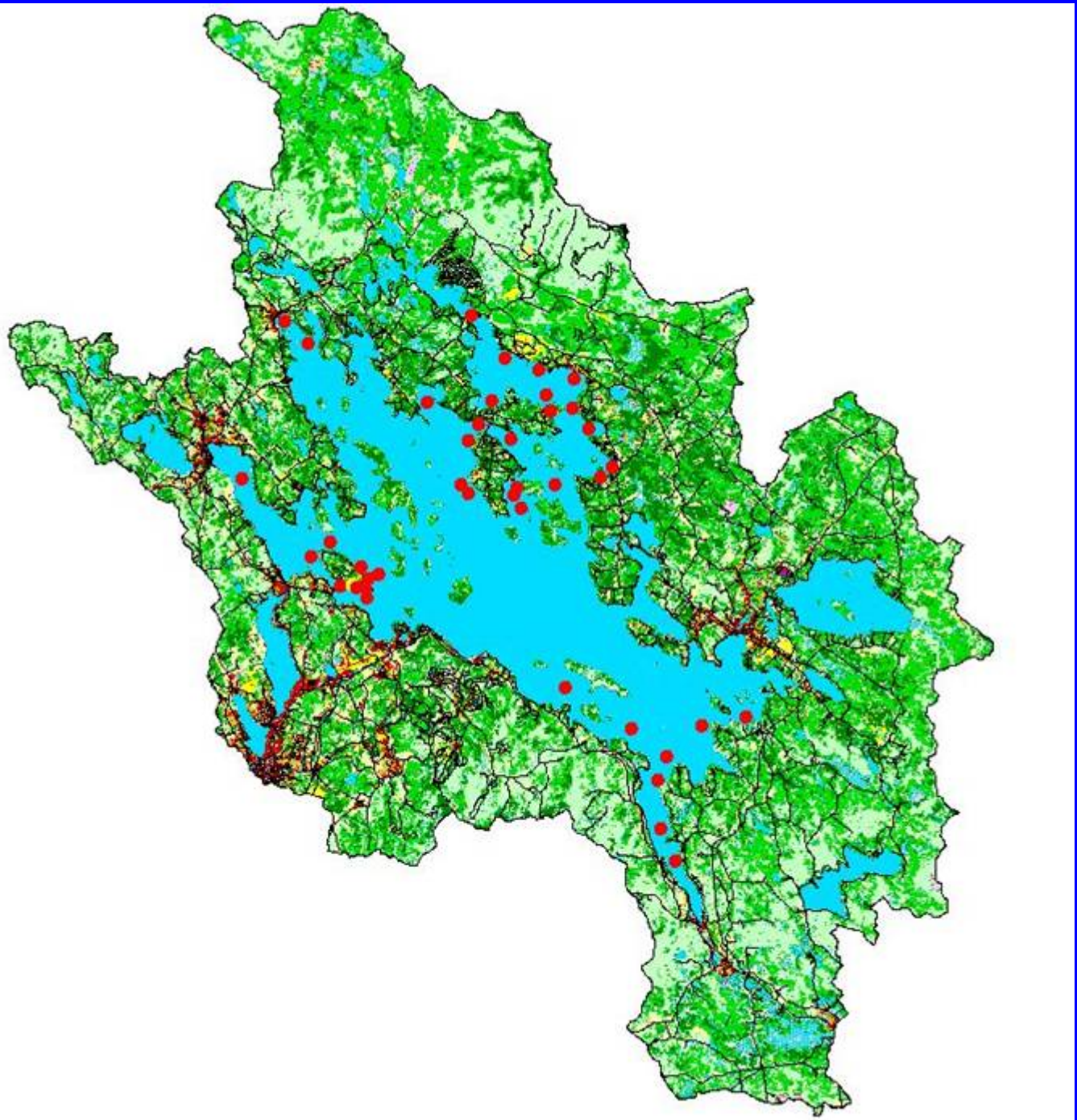
Conway Lake 1987/ Squam Lake 1990 – Nutrients

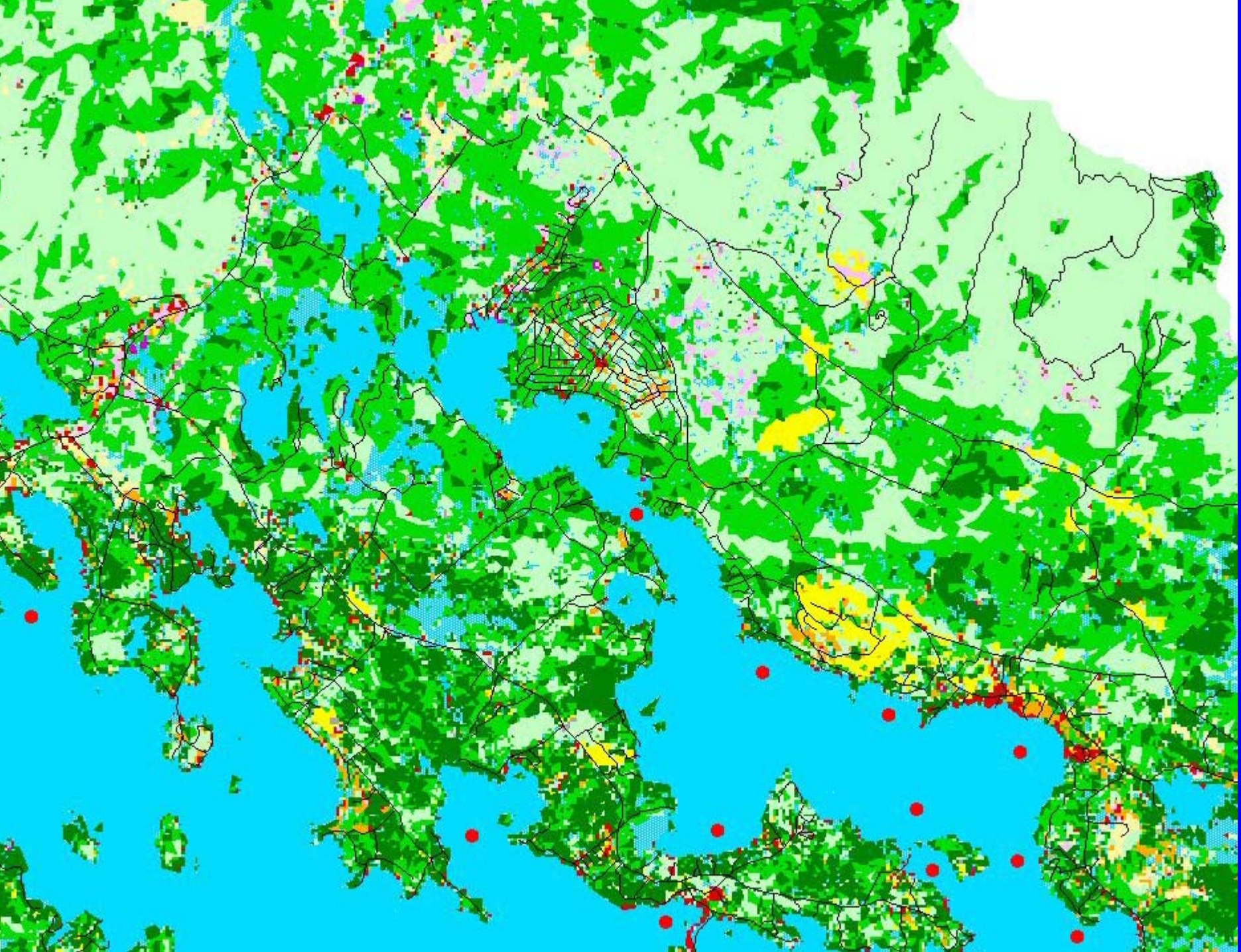




LAKE WINNIPESSAUKEE WATERSHED

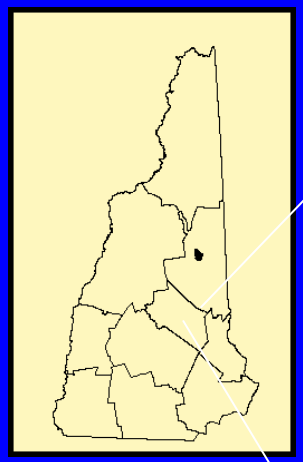


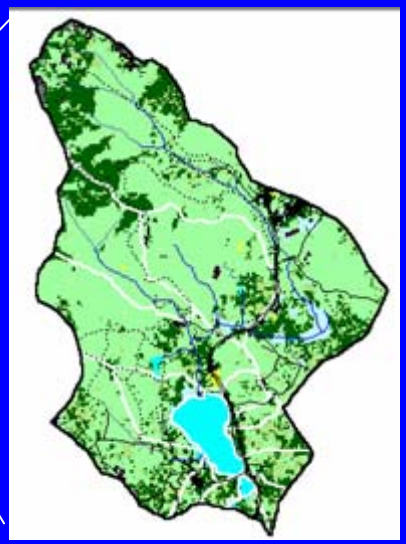




Boats Spread Nuisance Aquatics

Lake Monitoring and NPS Program Partnerships Deliver: The Lake Chocorua Project





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NEW HAMPSHIRE LAKES LAY MONITORING

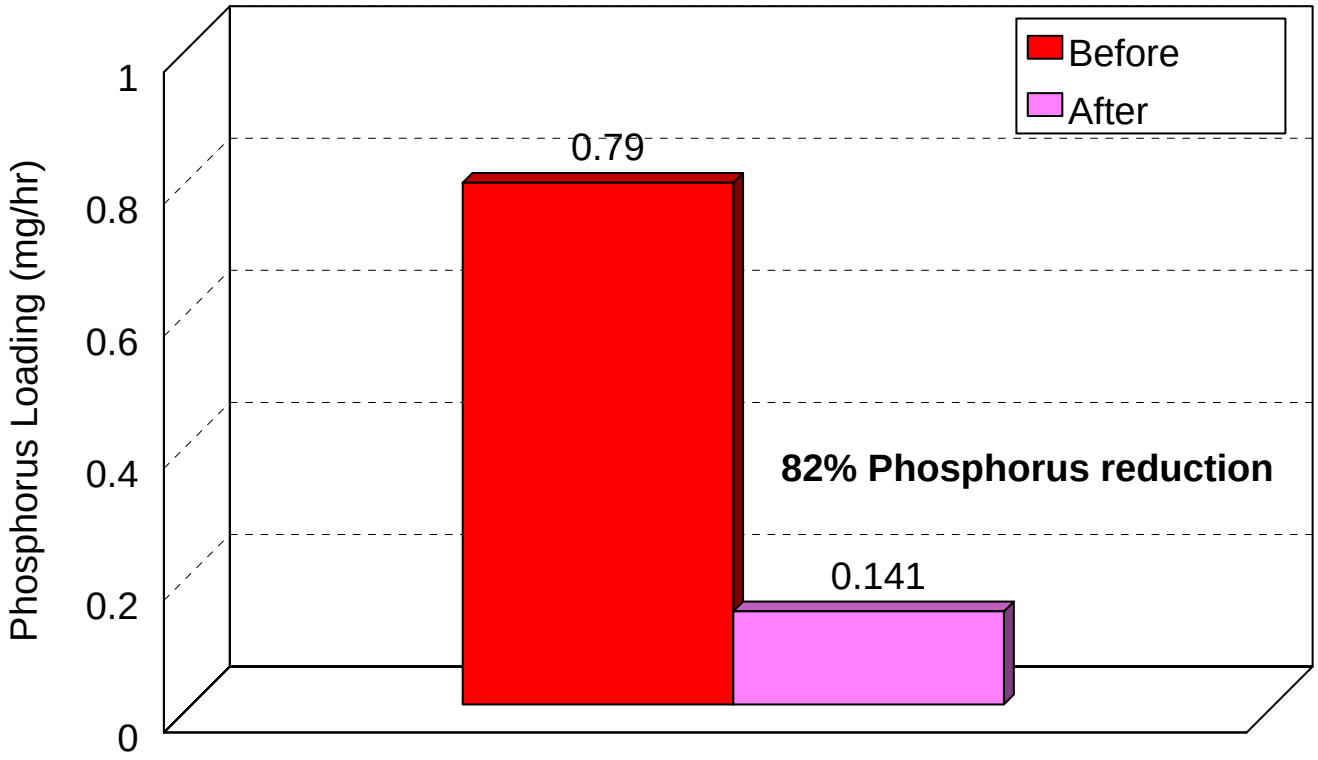
Tributary Sampling/Nutrient Budget

BMP Work:

- **New culverts and culvert extensions** *to outlet runoff safely to stable areas*
- **Diversion ditches** *to divert runoff away from the beach area and lake*

BMP Work:

Site 5A: Before and After BMP Implementation

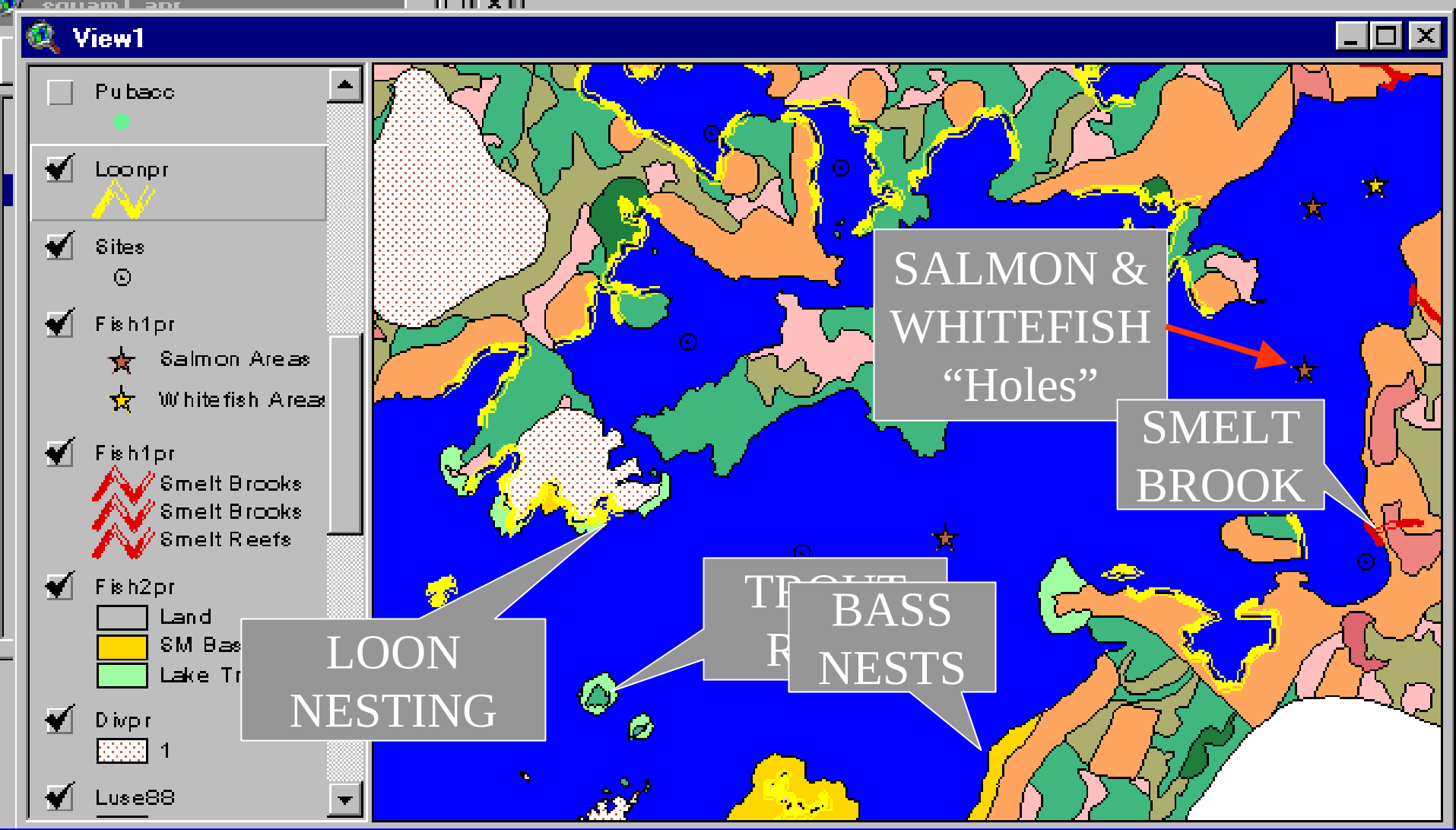


Squam Lakes Watershed Natural Resources Inventory

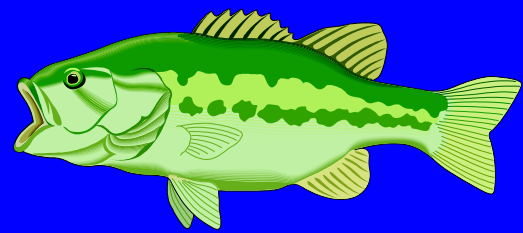
In-Lake Wildlife Habitat

- Loon Habitat/Nesting Sites
- SM Bass Nesting Habitat
- Smelt Brooks
- Trout/Whitefish Reefs
- Salmon “Holes”

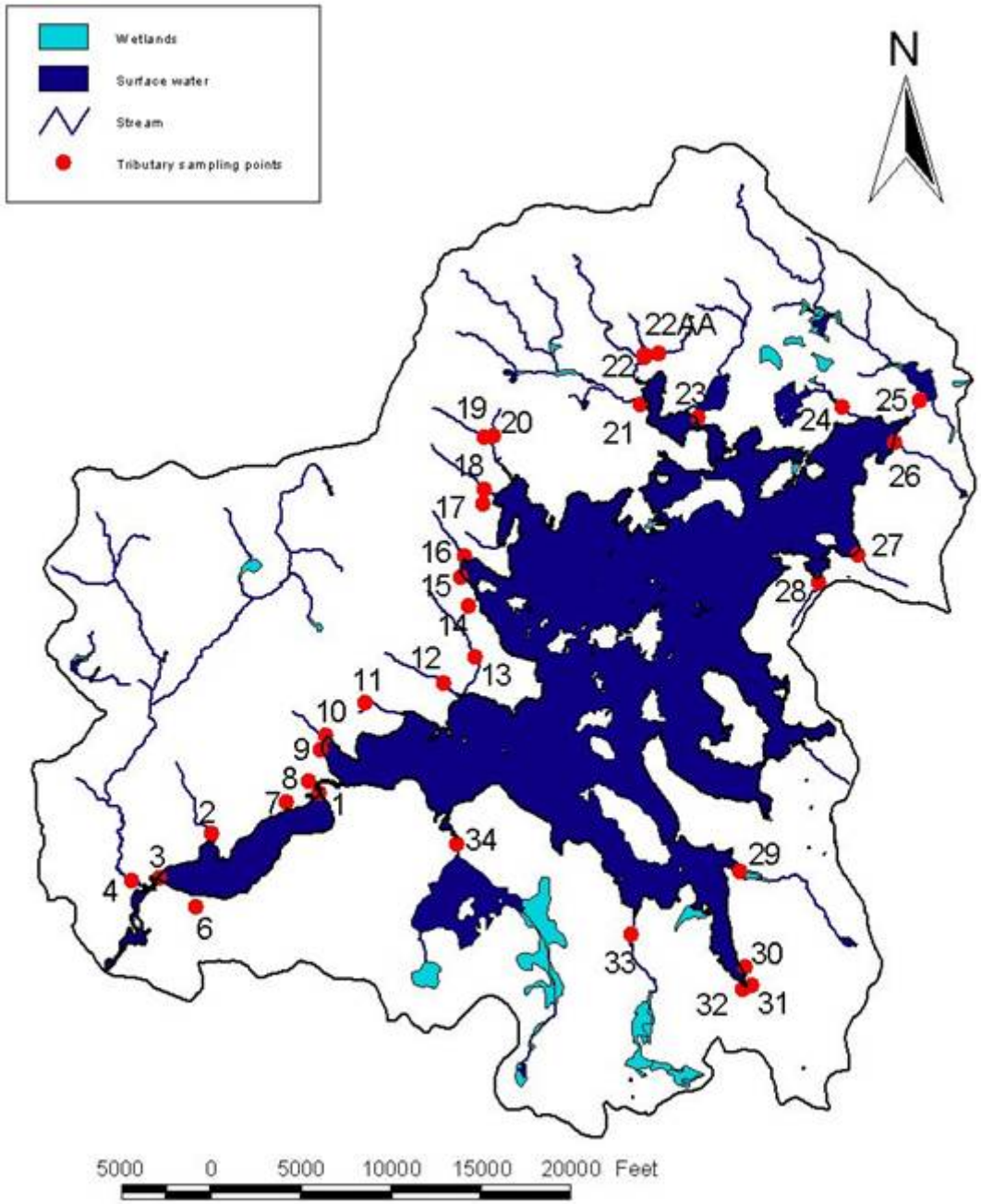
Linked to GIS by basin and corresponding subwatershed



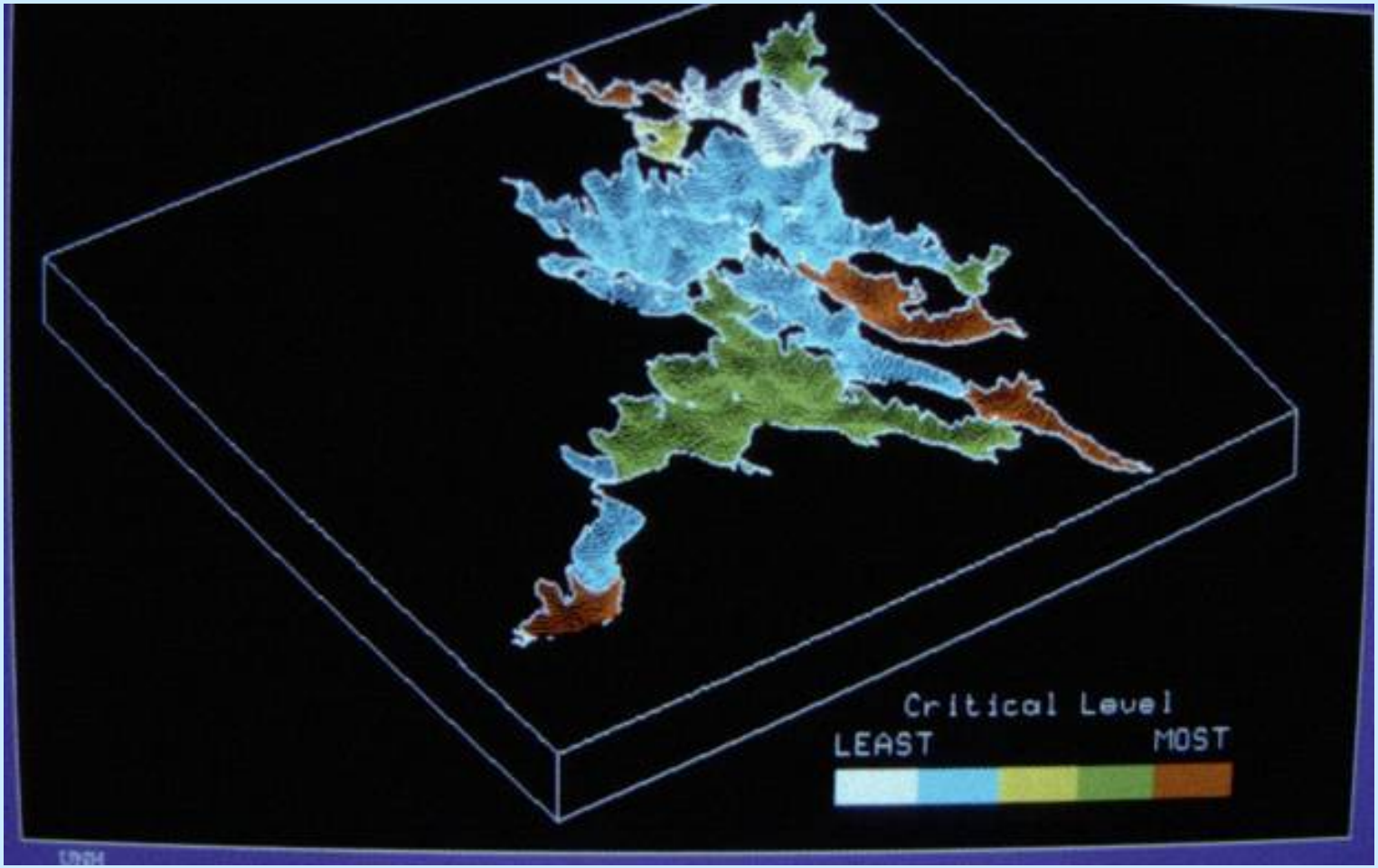
Squam Lake Wildlife Inventory

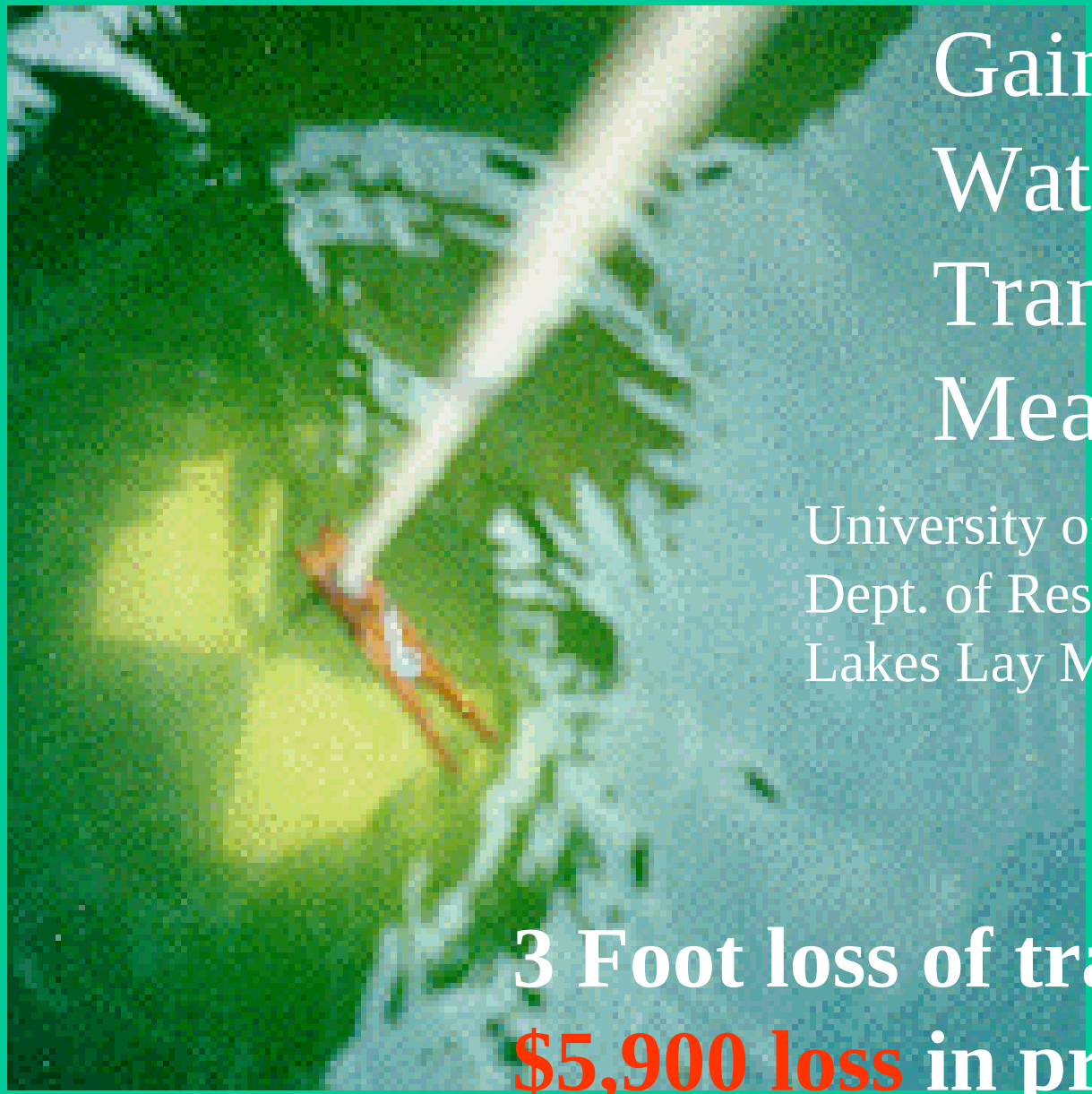


Tributary Sampling Sites



Long-term Data Analysis





Gaining Clarity on Water Transparency Measurements

University of New Hampshire
Dept. of Resources Economics
Lakes Lay Monitoring Program

3 Foot loss of transparency = $5,900 loss in property value!

PROJECT LAKEWATCH

The Future

- TMDL and Nutrient Criteria
- As spatial analysis systems improve more data is needed to utilize their power.
- As remote sensing technology improves more data and ground-truthing will be required.
- As resources (time/$$) are limited- need cost effective sampling and collaborative efforts.